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CTSO Course Alignments: Principles of Agricultural Mechanics

Below you will find standards for the Principles of Agricultural Mechanics course aligned with competitive events from appropriate career and technical student organizations (CTSOs). Knowing the aligned events for your organization will allow you to have additional tools for teaching course standards, as well as increase student engagement and preparation in your CTSO activities. The final column recommends potential tools from other CTSO organizations. Even if your students are not participating in these organizations, available rubrics, tools, and materials can also add to the instructional resources at your disposal for best teaching your content.

Important to note: While the aligned activities below can be important tools in teaching course standards, it is important to note that events may not cover a standard in its entirety and should not be the sole instructional strategy used to address a standard.

	STANDARD	ALIGNED FFA COMPETITIVE EVENTS/PROGRAMS	OTHER POTENTIAL CTSO TOOLS & RESOURCES
1	Identify the benefits of knowing and applying basic safety procedures in both an agricultural laboratory and workplace. Interpret current Occupational Safety and Health Administration (OSHA) guidelines to conduct a compliance review of the agricultural laboratory, including a written summary justifying the findings with recommendations for improving the safety of working conditions. (TN Reading 1, 2; TN Writing 1, 4, 7, 9)		• **SkillsUSA**: Occupational Health and Safety
2	Review common laboratory safety procedures for tool and equipment operation in the agricultural and biosystems engineering laboratories, including but not limited to accident prevention and control procedures. Demonstrate the ability to follow safety and operational procedures in a lab setting and complete a safety test with 100 percent accuracy. (TN Reading 3; ARNR CS)		• **HOSA**: Biomedical Laboratory Science • **SkillsUSA**: Occupational Health and Safety • **TSA**: Biotechnology Design
3	Outline the basic principles and procedures of effective project planning. Create and present a project plan for an agricultural mechanics project or a supervised agricultural experience program related to agriculture mechanics. (TN Reading 2; TN Writing 4)	• **FFA**: Agricultural Technology and Maintenance	• **HOSA**: Prepared Speaking • **TSA**: Prepared Presentation

4	Using industry-specific terminology, identify components for preparing a budget and cost estimate. Develop a budget using a scaled drawing or blueprint to construct or repair an agriculture mechanics project. (TN Reading 1, 7; TN Writing 8; TN Math N-Q, s-SSE)		
5	Compare and contrast the chief features, functions, and applications of two-cycle engines, four-cycle engines, and electric motors. Citing technical references, recommend a maintenance schedule specific to the working environment (such as indoor/outdoor conditions, exposure to heat or cold) of the engine and/or motor. Conduct the appropriate maintenance with adherence to specifications outlined in the schedule. (TN Reading 1, 2; TN Writing 2, 4, 7, 8, 9)	• **FFA**: Agricultural Technology and Maintenance	• **SkillsUSA**: Automotive Service Technology, Power Equipment Technology
6	Identify and differentiate between the different types of fuel and power sources used in conjunction with engines and motors. Recommend the types and sizes of engines/motors best suited for a range of applications. Provide a written justification, citing specific textual evidence, to support the recommendation. (TN Writing 1, 7, 9)	• **FFA**: Agricultural Technology and Maintenance	• **HOSA**: Researched Persuasive Speaking • **SkillsUSA**: Automotive Service Technology, Power Equipment Technology
7	Using topographical maps and appropriate mathematical equations, determine the acreage of a specific plot of land. Document and defend the methods used to arrive at the result, annotating calculations and field notes in a manner easily retrieved by other readers. (TN Reading 3, 4; TN Writing 4, 7; TN Math N-Q, G-CO, G-MG)	• **FFA**: Agricultural Technology and Maintenance, Land Evaluation	
8	Apply precision surveying processes and geographic information system (GIS) technology to calculate the acreage of a specific plot of property. Using field notes and digital data (such as GIS overlays), develop a written survey report of the designated plot to include, at minimum, measurements, degrees, markers, and other notable geographic parameters. (TN Reading 3, 7; TN Writing 2, 7, 9; TN Math N-Q, G-CO, G-MG)	• Agricultural Technology and Maintenance, Land Evaluation	
9	Analyze the interrelationships among plants, water, air, and soil to maximize the health and productivity of agricultural crops. Calculate the permeability rate, available water holding capacity, pH levels, and nutrient levels for a specific soil type. (TN Reading 4; TN Math N-Q, F-BF)	• **FFA**: Land Evaluation	
10	Apply physics concepts governing various pumping systems and delivery options to achieve the optimum irrigation and drainage required for row crop, greenhouse, and nursery operations in various soil-plant-climate combinations. Develop irrigation schedules to satisfy the design daily irrigation requirements (DDIR) for specific crops, citing specific textual evidence. (TN Reading 1; TN Writing 4; TN Math N-Q, A-CED, F-BF)	• **FFA**: Land Evaluation	

11	Compare and contrast irrigation methods for row crops, attending to such factors as water conservation, efficiency, and cost. Investigate and document findings on the effectiveness and efficiency of a surface irrigation versus a drip irrigation method, developing claim(s) and counterclaim(s) for scenarios in which each method would be most applicable. (TN Reading 1; Writing 1, 7, 9; TN Math N-Q, F-IF)	• **FFA**: Land Evaluation	• **HOSA**: Biomedical Debate • **TSA**: Debating Technological Issues
12	Interpret plans and working drawings to select appropriate building materials for a given agricultural structure. Using correct units and measurements, draft a written bill of materials enumerating the quantities of each selection, including but not limited to concrete, masonry, wood, metal, and composite materials. (TN Reading 3, 4, 5; TN Writing 2, 4, 9; TN Math N-Q, A-REI, G-MG)		
13	Applying construction principles pertaining to wood, concrete, metal, masonry, plumbing and electricity construct or repair an agricultural structure according to prescribed working plans. (TN Reading 3, 7; TN Math N-Q, G-MG)	• **FFA**: Agricultural Technology and Maintenance	• **SkillsUSA**: Teamwork; Plumbing, Welding, Carpentry, Masonry, Electrical Construction Wiring
14	Compare and contrast the physical and chemical properties of arc welding, metal inert gas (MIG) welding, gas welding, soldering, and brazing. Demonstrate the ability to precisely follow operational and safety procedures for each fusion process across various applications. (TN Reading 3)	• **FFA**: Agricultural Technology and Maintenance	• **SkillsUSA**: Welding
15	Classify the physical and chemical properties associated with various metal-cutting methods. Demonstrate adherence to operational and safety procedures for using oxy-fuel or plasma in applications involving mild steel, copper, sheet metal, and cast iron. (TN Reading 3)	• **FFA**: Agricultural Technology and Maintenance	• **SkillsUSA**: Welding
16	Select and demonstrate the best method to construct, connect, or repair metallic and non-metallic materials for a variety of agricultural applications, including but not limited to plumbing, sheeting, and equipment. (TN Reading 3)	• **FFA**: Agricultural Technology and Maintenance	
ALL	**CAN BE USED WITH ALL/MOST STANDARDS**	• **FFA**: Agriscience Fair, Agricultural Technology and Maintenance	• **FCCLA**: Illustrated Talk, Chapter in Review Display, Chapter in Review Portfolio • **SkillsUSA**: Career Pathways Showcase, Job Skills Demonstration A, Job Skills Demonstration O, Prepared Speech, Extemporaneous Speaking, Chapter Display